Transparency Does Not Cause Autocratic Instability: A Research Note

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Abstract

Does transparency undermine the stability of authoritarian regimes? Hollyer, Rosendorff and Vreeland (2015) claim that transparency destabilizes autocracies via mass protest. In this paper we posit a twofold critique of their empirical analysis. First, we show that transparency is not a significant predictor of autocratic instability, either on its own or in comparison to other factors such as education, educational inequality, media access, and variations in the level of democracy. Second, we demonstrate that the effect of transparency on mass unrest disappears if the time series used to measure unrest is extended to match data used for survival analysis. Results show that autocracies are not more vulnerable when transparency is high and transparency does not predict mass unrest. Thus, neither the result nor the mechanism posited in the article survive rigorous empirical scrutiny.

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1. Introduction

Does transparency undermine the stability of authoritarian regimes? A recent contribution by Hollyer, Rosendorff and Vreeland (2015) (from now on HRV) advances the claim that transparency – defined as the availability of public economic information – can serve as a catalyst for collective action, increasing the risk that an autocratic regime experiences mass unrest that can challenge or overthrow its rule. HRV's model yields three empirical implications: (1) higher transparency is associated with a greater risk to autocratic survival, (2) higher transparency increases instability more in low-growth environments (as citizens gain a more accurate picture of their government's poor performance), and (3) transparency is associated with mass mobilization (defined as strikes and anti-government demonstrations) as opposed to other forms of unrest.

The goal of this paper is twofold. First, we show that HRV fails to report meaningful confidence intervals for the hazard ratios generated by Cox Proportional Hazards models. After successfully replicating the authors' results, we produce such estimates and show that, when uncertainty is properly reported, even large changes in levels of transparency do not significantly affect the hazard rate faced by a given autocratic regime. In contrast, we show that other factors such as education levels and media access have a clear effect on hazard rates.

Second, we detect inconsistencies in the duration of time-series data used for different sections of the article. HRV runs count models to predict the number of riots faced by autocracies. The article claims that transparency is associated with episodes of unrest from below rather than from above. By reestimating the negative binomial models used in the article with time series data consistent with the rest of the article, we find that transparency does not predict episodes of unrest of any kind. These shortcomings cast doubt on the article's main findings and suggest a reexamination of its theoretical claims.

The rest of the paper is organized as follows. Section 2 briefly summarizes our replication of HRV. Section 3 addresses the estimation of uncertainty and omitted variables within HRV's Cox Proportional Hazards models, showing that transparency is a poor predictor of autocratic collapse. Section 4 focuses on inconsistencies in the use of time-series data and faults in the estimation of fixed-effects negative binomial models, showing that transparency does not predict mass unrest. The final section concludes.

2. Replication

We were able to replicate the results in HRV (2015). The paper uses a relatively recent dataset on the duration of authoritarian regimes (Svolik, 2012). HRV estimates the effect of transparency and growth on the risk faced by autocratic regimes using a Cox Proportional Hazards model. [1] For a given regime l at time t the hazard rate is defined as:

$$h_l(t) = h_0(t)\exp(\gamma \text{Transparency}_{l,t-1} + \delta \text{Growth}_{l,t-1} + \mu \text{Transparency}_{l,t-1} \times \text{Growth}_{l,t-1} + X_{l,t-1}\beta)$$

HRV finds that transparency increases the risk of autocratic collapse due to mass unrest and that this effect is higher when economic performance is poor: autocracies are more likely to be removed when times are tough and people have a clear sense of how bad things are. These findings are best summarized in Figure 1. To construct the plot, we follow the same procedure as the authors: 1) we select the 10th and the 90th percentiles of transparency and growth, 2) generate the four relevant interactions between these variables, and 3) plot the hazard rates for each combination. When transparency is low, a hypothetical autocracy in its 10th year faces a roughly 2% chance of collapse, and the effect of growth is negligible. For the same regime,

[1] All the predictors are lagged by one period and the models include a set of controls.

when transparency is high, the chance of collapse is around 2% when growth is high and more than 4% when growth is low. Transparency matters, and matters more when growth is low.

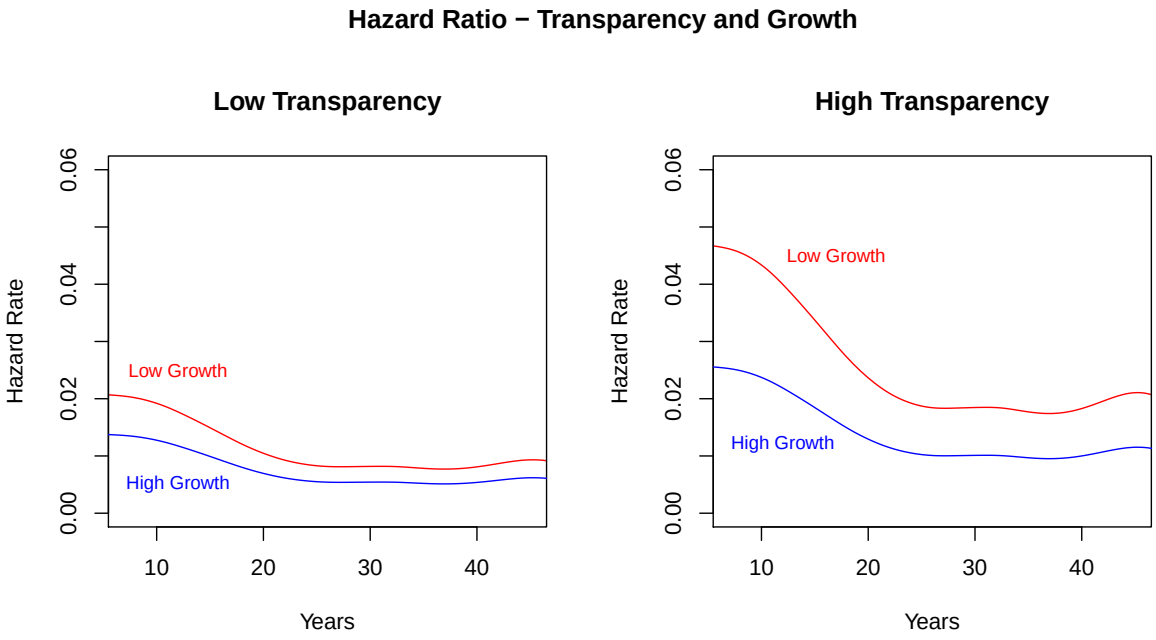

Figure 1: Hazard rate by transparency and growth (Figure 4, p. 777 in HRV)

Note: This figure displays instantaneous hazard rates (the probability of a given regime in time t failing at time $t+1$). The first panel shows hazard rates for low- and high-growth regimes in a low-transparency environment. The second panel shows hazard rates for low- and high-growth regimes in a high-transparency environment.

To provide empirical support for the claim that transparency only has an effect on stability via mass unrest, HRV uses measures of unrest for a given country-year, dividing events into instances of collective action from below (strikes and demonstrations) and those that do not require mass mobilization (revolutions, coups, guerrilla warfare, and assassination).[2] As shown in Figure 2, HRV finds that transparency only has an impact on mass unrest.[3]

[2]The source is the Cross-National Time-Series Archive (Banks and Wilson (2015).
[3]HRV makes no prediction regarding riots.

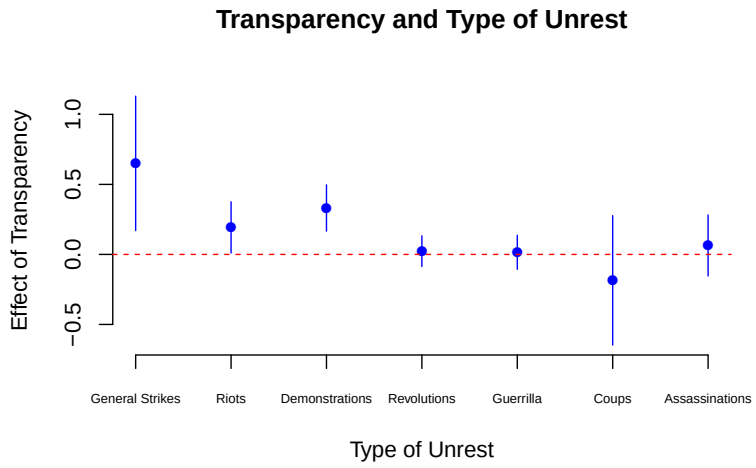

Figure 2: Transparency and Type of Unrest (Coefficients from Table 3, p. 781 in HRV)

Note: This panel shows the estimated coefficients for the effect of transparency on various measures of unrest. Bars indicate 95% confidence intervals.

2. Transparency does not predict collapse

A scientific statement is one that is made with an honest estimate of uncertainty (Glibert et al., 2016). While HRV shows the statistical significance of the effects of transparency for Cox PH models, the article fails to present an appropriate measure of uncertainty regarding the hazard ratios generated by these models – the relative risk faced by regimes with higher or lower levels of transparency. This is particularly important given the low number of events (regime failures through democratization or revolt) in the data relative to the number of regressors; none of the models satisfies the recommended level of more than 10 events per variable (Peduzzi et al., 1995), possibly rendering estimates biased and inconsistent.

In this section, we propose a means of estimating and graphically displaying confidence intervals for hazard ratios through Monte Carlo simulation. We show two things. First, once uncertainty is taken into account, even the effect of a large increase in transparency as measured by the HRV index is indistinguishable from zero. Second, we show that education, educational inequality, press freedom, media access, and the level of democracy are stronger predictors of autocratic

instability.

2.1. Reporting uncertainty

In a Cox PH model units face a baseline hazard rate $h_0(t)$, the probability that a unit in time t will experience an event (in this case autocratic regime collapse due to mass unrest) at time $t+1$. This baseline hazard rate (which depends on time but not unit covariates) is increased or diminished by a covariate-dependent term $e^{Xi'\beta}$.

Values of $e^{Xi'\beta}$ greater than one increase the overall hazard rate, while values of less than one decrease the overall hazard rate. In comparing a regime j with a given set of coefficients X_j (a high-transparency regime) to a different regime k with coefficient values X_k (a low-transparency regime), establishing that j faces a higher risk of collapse than k entails showing that the hazard ratio $\frac{e^{Xj'\beta}}{e^{Xk'\beta}}$ is greater than one: j faces a higher level of risk compared with k.

While HRV reports 95% confidence intervals for each point estimate in the Cox models, the article does not provide a clear measure – graphical or numerical – for whether regimes with higher levels of transparency face significantly higher risk levels once the full variation of all coefficients affecting the hazard ratio (say, between high- and low-transparency regimes) is taken into account. The exclusion of plotted confidence intervals from the article's original figure (replicated by Figure 1, shown above) is understandable, since overlapping confidence bands for survival curves do not necessarily imply an overlap of hazard ratios. Yet, HRV claims to have run (never reported) simulations to estimate the effect of transparency on hazard rates in high-growth and low-growth environments, yielding results that are "suggestive, but do not attain conventional standard of significance" (p. 777).

To derive 95% confidence intervals for the difference in hazard rates faced by the hypothet-

ical regimes in Figure 1, we likewise run Monte Carlo simulations to estimate the range of risk differentials faced by regimes with high and low levels (the 90th and 10th percentiles of sample values) of transparency and growth.[4] The interpretation of the figure presented below is straightforward: if the simulated confidence intervals cross one, then we cannot determine whether the change in values is associated with an increase or decrease in the hazard rate faced by a regime.

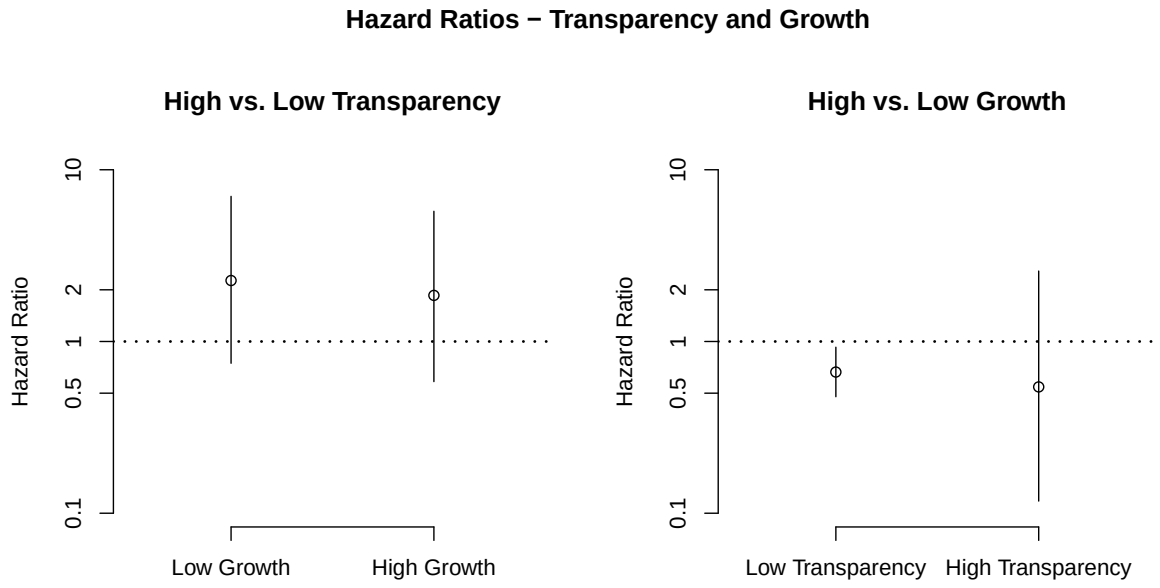

Figure 3: Hazard ratios and uncertainty estimates for transparency and growth for Figure 4, p. 777 in HRV)

Note: This figure displays estimated hazard ratios, graphed on a logarithmic scale so that hazard ratios which double and halve the hazard rate appear at the same vertical distance from one. The first panel shows the estimated effect of moving from low to high levels of transparency for low- and high-growth regimes. The second panel shows the estimated effect of moving from low to high levels of growth in low- and high-transparency regimes. Values below one indicate that the change in coefficient value is associated with a reduction in the hazard rate; values above one indicate that the change in coefficient value is associated with an increase in the hazard rate. Bars indicate 95% confidence intervals derived from Monte Carlo simulations.

The left panel of Figure 3 shows the effect of moving from low transparency to high transparency under conditions of low and high growth. While we do find a positive effect of transparency on

[4]We use the set of coefficients from Model 8 in HRV. The variables *Party* and *Military* are held at zero, while *Ever Collapse* is held at one.

hazard rates in both cases – the point estimate lies above one – the 95% confidence intervals cross the value of one. Regardless of the level of growth, moving from low to high transparency is associated with anything from a sixfold increase in the likelihood of failure to a reduction in the hazard rate. The right panel shows the effect of moving from low growth to high growth under low and high transparency. The point estimates are negative, suggesting that high growth deceases the risk faced by autocracies, but the effect is only significant in low-transparency contexts. We conclude that the first claim in HRV is unwarranted: with appropriate measures of uncertainty, it is not clear that transparency increases the probability of autocratic collapse.

2.2. Factors that do predict collapse

In this section we present graphical results obtained by reestimating Model 8 in HRV with covariates other than transparency. We focus on measures of the circulation of information within societies and the ability of citizens process this information, contending that these factors will strongly predict autocratic collapse due to mass unrest.

1. Media access We first reestimate Model 8 in HRV by including two additional covariates: 1) a dichotomized measure of press freedom by Freedom House [5] and 2) a continuous measure of media access from the Varieties of Democracy Project (V-Dem). [6] In both cases, this renders the effect of transparency indistinguishable from zero (See Table 1 in the Appendix). Of course, there are likely problems of multicollinearity in such a regression, given that the HRV Transparency index and other forms of measuring 'openness' are highly correlated (Hollyer, Rosendorff and Vreeland, 2014).

We proceed to substitute the V-Dem measure of media access for transparency. In the model,

[5] Following HRV, we code countries designated Not Free by Freedom Freedom House (2015) as 1 and the remaining categories –Free and Partly Free– as 0.

[6] This is a subjective measure that gauges the percentage of the population that regularly has access to any print or broadcast media that are sometimes critical of the national government.

media access is associated with a higher risk rate (Model 1, Table 2 in the Appendix). [7] Results show that at low levels of media access the chance of regime failure due to mass unrest is practically zero, regardless of the level of growth. On the contrary, when media access is high (when 90 percent of the population has access), autocracies face a higher probability of failure. In this case, growth levels matter in a way consistent with theoretical expectations. During its first ten years, a low-growth autocracy with high media access faces a 14% chance of failure, while this chance is less than 5% for a high-growth autocracy. As shown in the third panel, low-media access regimes clearly experience lower hazard rates even when the variance of the hazard ratio is taken into account.

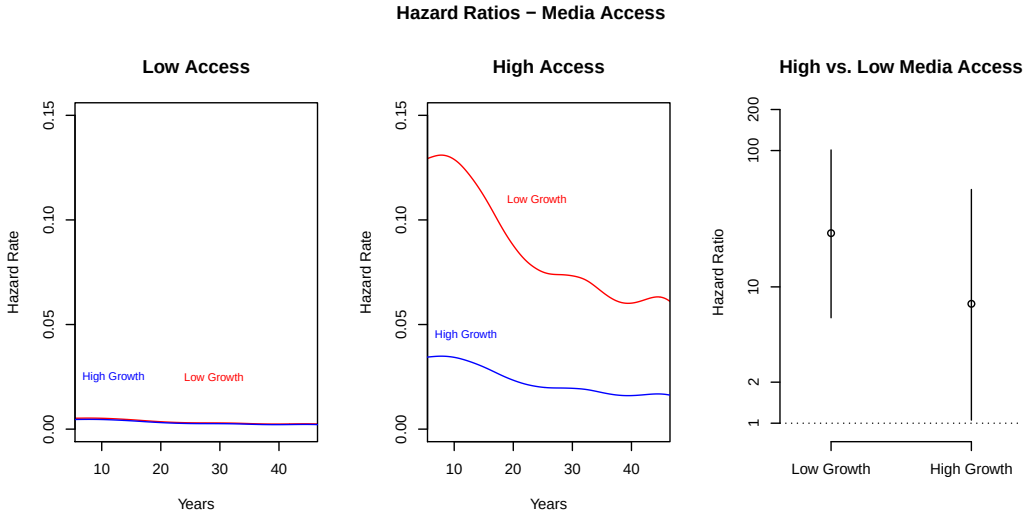

Figure 4: Hazard rate by level of media access and growth

Note: The first two panels show instantaneous hazard rates for regimes with different levels of growth and media access (at the 10th and 90th percentile of each measure within our sample). The third panel displays the hazard ratios resulting from a move from low levels of media access to high levels of media access for low- and high-growth regimes.

2. Education Next, we substitute education for transparency. This variable measures average years of education among citizens older than 15.[8] In the model, higher levels of education are associated with higher risk rates (Model 2, Table 2 in the Appendix). Again, we plot our

[7] To construct this and the subsequent plots in this section, we follow the same procedure followed to generate Figure 1.

[8] The variable draws from a variety of sources and is contained in the V-Dem dataset (see Coppedge et al. (2015) for more details).

results as above. For low levels of education, hazard rates are extremely low: in any particular year a regime has a roughly 0.1% chance of failure. At such a low level of education, growth makes no difference: regimes fail at a similarly low rate under conditions of high growth and low growth.

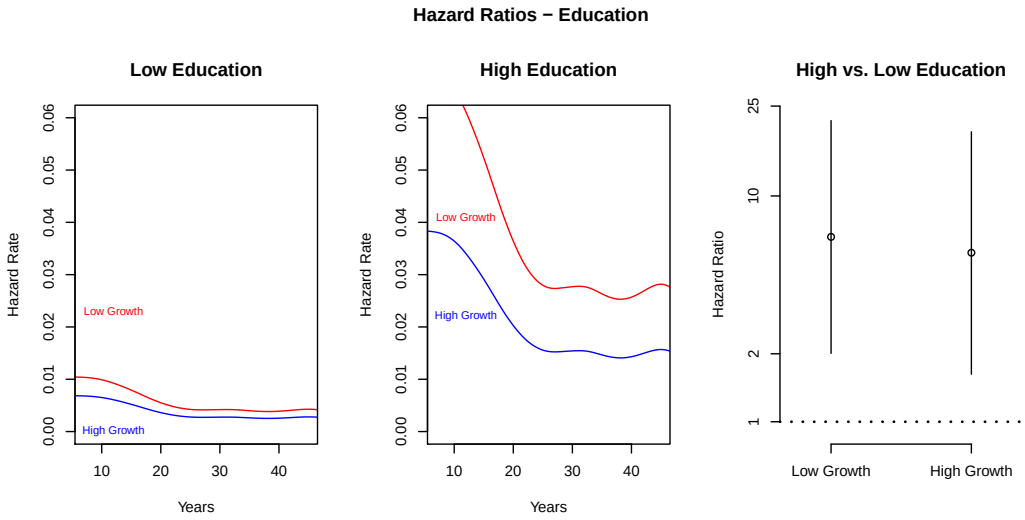

Figure 5: Hazard rate by level of education and growth

Note: The first two panels show instantaneous hazard rates for regimes with different levels of growth and education (at the 10th and 90th percentile of each measure within our sample). The third panel displays the hazard ratios resulting from a move from low levels of education to high levels of education for low- and high-growth regimes.

Educational inequality also matters. This variable is a Gini coefficient, meaning that zero represents perfect equality (everyone gets the same amount of education) and one represents perfect inequality (only one individual gets education).[9] The negative and significant coefficient suggests that when only the elite is educated, autocracies face a lower risk of failure. Results shown in Figure 6 confirm this result: when educational inequality is high, a regime faces a lower risk of failure, suggesting that educated elites are a source of stability. On the contrary, educational equality contributes to autocratic instability, although in high-growth environments the effect is not significant.

[9]Again, this variable draws on several sources assembled for the V-Dem project. It includes all levels of education: primary, secondary and higher.

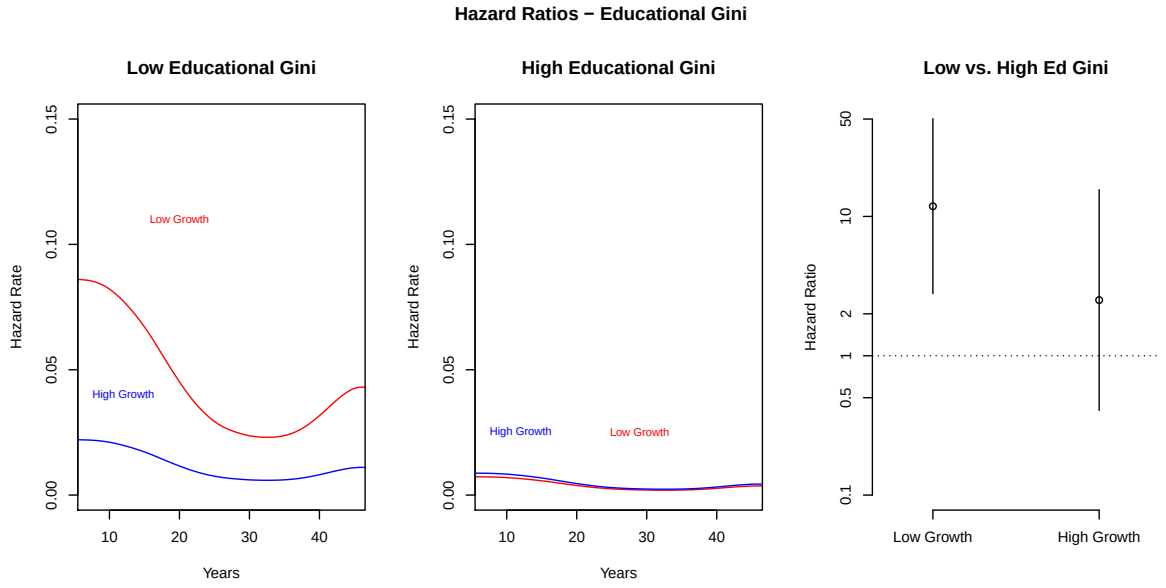

Figure 6: Hazard rate by educational inequality and growth

Note: The first two panels show instantaneous hazard rates for regimes with different levels of growth and educational inequality (at the 10th and 90th percentile of each measure within our sample). The third panel displays the hazard ratios resulting from a move from high levels of educational inequality to low levels of educational inequality for low- and high-growth regimes.

3. Level of democracy HRV only includes countries classified as autocracies following Svolik (2012), who extends the classification of regimes by Boix, Miller and Rosato (2012). This is a dichotomous measure. We use an alternative, fine-grained measure of electoral democracy developed by V-Dem. [10] The coefficient on this variable is positive and significant, suggesting that more democratic countries face a higher risk of failure. The plot confirms this result: more democratic regimes (at least within this range) are more likely to fail. Simulated confidence intervals are well below the unity. Thus, at least in the sample of fairly undemocratic countries included in the sample, more democracy means less stability. Since neither the executive was elected nor elections held in any of these cases, the effect must be due to the combination of freedom of expression and freedom of association.

[10]This variable is composed of the average of the weighted average of five components (freedom of association, suffrage, clean elections, elected executive, and freedom of expression) and the five-way multiplicative interaction between them. As such, it represents a compromise between additive indices (which allow components to be perfect substitutes) and multiplicative indices (which penalize in excess due to low scores in one dimension). In turn, each of these dimensions results from aggregating lower-level indices. Thus, the index of electoral democracy results from the aggregation of 37 lower-level indices. See Coppedge et al. (2015) for further details.

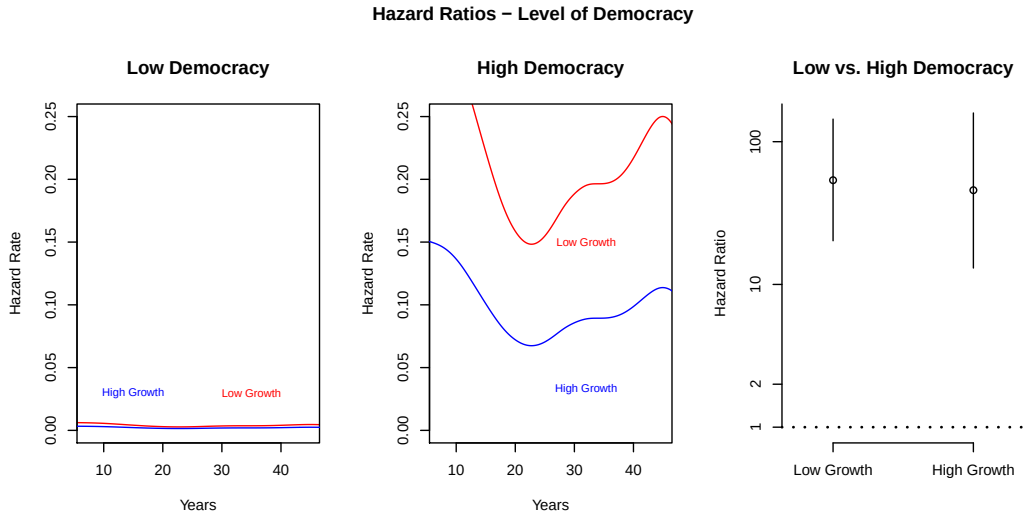

Figure 7: Hazard rate by level of electoral democracy and growth

Note: The first two panels show instantaneous hazard rates for regimes with different levels of democracy and growth (at the 10th and 90th percentile of each measure within our sample). The third panel displays the hazard ratios resulting from a move from low levels of education to high levels of democracy for low- and high-growth regimes.

These results call for a reexamination of the mechanisms posited in HRV. In particular, they suggest that the presence of effective channels of circulation and diffusion of information as well as the ability of citizens to process it are more relevant than the availability of public economic data.

3. Transparency does not predict mass unrest

In this section, we show that the claim that transparency affects the incidence of mass unrest disappears – even under HRV's own specifications – if the time-series data used is extended to match the data used to generate survival models. Additionally, we question the use of fixed-effects negative binomial models.

Even using the same Stata commands as HRV to estimate fixed-effects negative binomial models, we find it hard to justify why the time-series data HRV uses here to estimate the effects

of transparency extends only from 1980 to 1999, whereas survival analysis comprises the 1980-2007 period. There is no clear justification as to why HRV uses different time periods for each type of models.

We therefore extend the time-series data to match the time period used for the rest of the paper. Utilizing the same Stata commands as HRV to replicate Table 3 with the extended data set, there is no significant effect of transparency on mass unrest (strikes and demonstrations) versus other forms of unrest, as shown in Figure 8. In fact, there is no significant effect on any type of unrest. This erodes our confidence in the claim that transparency results in mass unrest.

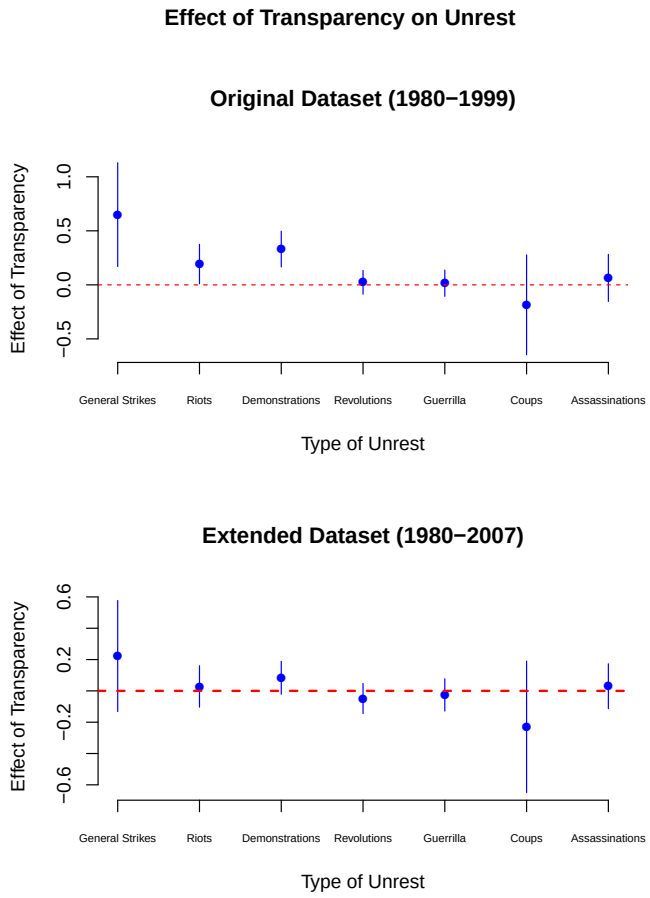

Figure 8: Estimated effect of transparency on unrest

Note: The upper panel shows the estimated coefficients for the effect of transparency on various measures of unrest using HRV's original dataset. The lower panel shows the estimated coefficienct for the effect of transparency on unrest using the same models but with the extended dataset. Bars indicate 95% confidence intervals.

An additional cause for concern is that HRV uses a fixed-effects negative binomial model to estimate the effect of transparency on over-dispersed count data of unrest, with the aim of controlling for time-invariant country-specific attributes. However, the estimation technique HRV implements in Stata [11] derives from a conditional likelihood method for negative binomial regression described by Hausman, Hall and Griliches (1984). This approach fails to account for time-invariant covariates, and as such leads to biased results and is not advised (see Allison and Waterman (2002)). [12] As far as we can tell, there does not exist an R-package that would

[11] Command xtnbreg, fe

[12] For example, the covariate *oil*, a binary variable measuring whether a given country is a fuel exporter, is time invariant for all regimes and thus should drop out of a true fixed-effects estimation, yet the fixed-effect

directly implement the Hausman, Hall, and Griliches method used in Stata.

To compare approaches, we follow Allison's suggestion by estimating the effect of transparency using dummy variables for each country. Even closely matching the Stata estimation procedure for handling zero-inflated observations [13], we derive different estimates from HRV. In replicating Table 3 with the original dataset (Table 4 in the Appendix), transparency continues to have a significant effect on anti-government demonstrations and riots. Yet it also has a significant effect on assassinations – not a form of mass unrest under HRV's typology. Replicating Table 3 with the extended dataset (Table 5) using this technique shows a significant effect for transparency only on demonstrations, not on strikes. We therefore conclude that there is little evidence to support the claim that transparency affects autocratic stability through mass unrest.

4. Conclusion

In this paper we have shown two shortcomings in HRV: failure to report appropriate estimates of uncertainty for proportional hazard models and inconsistencies in the estimation of negative binomial models. We supply a remedy for each. First, in providing a measure of uncertainty for hazard ratios, we demonstrate that transparency does not predict autocratic collapse. These events are better predicted by factors related to the effective diffusion of information and the citizens' ability to process it. Second, the inclusion of the full set of observations render the effect of transparency on mass unrest insignificant. These findings render both the result and the mechanism posited in HRV questionable.

negative binomial estimates a coefficient for it regardless.

[13] Stata excludes all countries with only one observation or with zero events.

5. Appendix

Table 1: Cox PH Models - Press Freedom and Transparency

	Survival	
	(1)	(2)
Transparency	0.173	0.156
	(0.159)	(0.154)
Press Freedom	−1.076**	
	(0.406)	
Media Access		0.059***
		(0.013)
Growth	−0.033*	−0.053**
	(0.025)	(0.028)
Trans x Growth	−0.002	−0.008
	(0.022)	(0.024)
Party	−0.196	−0.736
	(0.450)	(0.488)
Mil	0.565	0.672*
	(0.416)	(0.414)
Ever Collapse	0.817*	0.763*
	(0.558)	(0.527)
Observations	1,667	1,570
R^2	0.010	0.020
Max. Possible R^2	0.119	0.124
Note:	*p<0.1; **p<0.05; ***p<0.01	

Table 2: Cox PH Models - Alternative Variables

	Survival			
	(1)	(2)	(3)	(4)
Media Access	0.061***			
	(0.013)			
Education		0.286***		
		(0.081)		
Ed. Inequality			−0.032***	
			(0.011)	
Democracy (V-Dem)				10.290***
				(1.433)
Growth	0.025	−0.027	−0.142*	−0.041
	(0.077)	(0.053)	(0.086)	(0.060)
Media Access x Growth	−0.002			
	(0.002)			
Education X Growth		−0.002		
		(0.011)		
Ed. Gini X Growth			0.002	
			(0.002)	
Democracy X Growth				−0.030
				(0.158)
lag_party	−0.631	−0.053	−0.197	−1.715***
	(0.477)	(0.414)	(0.435)	(0.522)
lag_mil	0.800**	0.924**	1.070***	0.616
	(0.414)	(0.415)	(0.443)	(0.470)
ever_collapse	0.803*	0.678	0.573	1.261*
	(0.530)	(0.519)	(0.536)	(0.631)
Observations	1,570	1,558	1,457	1,570
R^2	0.020	0.011	0.011	0.043
Max. Possible R^2	0.124	0.125	0.122	0.124
Note:				*p<0.1; **p<0.05; ***p<0.01

Table 3: HRV Table 3, Extended Dataset (Stata, xtnbreg)

	Strikes	Riots	Demonstrations	Revolutions	Guerilla	Coups	Assassinations
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Lag Unrest	0.271***	0.105***	0.103***	0.265***	0.623***	−0.293	0.095***
	(0.103)	(0.020)	(0.015)	(0.037)	(0.082)	(0.444)	(0.034)
Transparency	0.222	0.028	0.084	−0.049	−0.026	−0.229	0.030
	(0.189)	(0.067)	(0.054)	(0.049)	(0.053)	(0.214)	(0.073)
Growth	−0.017	0.007	−0.013	0.002*	0.007	−0.049*	−0.020**
	(0.015)	(0.009)	(0.013)	(0.006)	(0.003)	(0.027)	(0.009)
Trans x Growth	−0.019	−0.006	−0.007	0.001	0.001	−0.019**	−0.006
	(0.013)	(0.006)	(0.004)	(0.002)	(0.003)	(0.009)	(0.004)
Constant	−3.18***	−1.66***	−1.72***	5.55	9.54	7.96	−2.45***
	(0.97)	(0.592)	(0.418)	(26.90)	(20.04)	(67.04)	(0.681)
Controls	✓	✓	✓	✓	✓	✓	✓
Observations	761	1,349	1,417	1,401	929	609	949

Note: *p<0.1; **p<0.05; ***p<0.01

Table 4: HRV Table 3, Original Dataset (Country Dummies)

	Strikes	Riots	Demonstrations	Revolutions	Guerilla	Coups	Assassinations
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Lag Unrest	0.186	0.069*	0.117***	0.188***	0.558***	−0.118	0.009
	(0.123)	(0.039)	(0.028)	(0.040)	(0.102)	(0.411)	(0.050)
Transparency	0.533	0.195*	0.384***	0.016	0.009	−0.253	0.370***
	(0.327)	(0.118)	(0.108)	(0.056)	(0.062)	(0.245)	(0.140)
Growth	−0.015	0.004	−0.015	0.002	0.005	−0.059**	−0.049***
	(0.017)	(0.012)	(0.010)	(0.007)	(0.008)	(0.026)	(0.012)
Trans x Growth	−0.017	−0.010*	−0.004	0.002	0.002	−0.022**	−0.013*
	(0.015)	(0.006)	(0.006)	(0.003)	(0.004)	(0.009)	(0.008)
Constant	−2.757**	−3.393***	−3.503***	−0.331	−2.750**	−1.227	1.841**
	(1.240)	(1.098)	(1.300)	(0.521)	(1.106)	(1.780)	(0.852)
Controls	✓	✓	✓	✓	✓	✓	✓
Observations	588	984	1,012	1,006	674	511	635

Note: *p<0.1; **p<0.05; ***p<0.01

Table 5: HRV Table 3, Extended Dataset (Country Dummies)

	Strikes	Riots	Demonstrations	Revolutions	Guerilla	Coups	Assassinations
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Lag Unrest	0.267**	0.130***	0.126***	0.262***	0.627***	−0.323	0.271***
	(0.118)	(0.039)	(0.027)	(0.036)	(0.082)	(0.430)	(0.045)
Transparency	0.007	0.029	0.136*	−0.047	−0.027	−0.178	0.068
	(0.209)	(0.092)	(0.080)	(0.048)	(0.053)	(0.218)	(0.097)
Growth	−0.018	−0.010	−0.016*	0.002	0.008	−0.053**	−0.035***
	(0.016)	(0.010)	(0.009)	(0.006)	(0.007)	(0.026)	(0.011)
Trans x Growth	−0.020	−0.011**	−0.008*	0.001	0.001	−0.019**	−0.012**
	(0.014)	(0.005)	(0.005)	(0.002)	(0.003)	(0.008)	(0.005)
Constant	−5.678***	−2.965***	−2.616***	−0.333	−0.418	−3.246**	−1.459*
	(1.382)	(0.800)	(0.741)	(0.409)	(0.433)	(1.597)	(0.800)
Controls	✓	✓	✓	✓	✓	✓	✓
Observations	768	1,360	1,384	1,411	933	616	982

Note: *p<0.1; **p<0.05; ***p<0.01

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